

Amino Acids Classifications

Share & Care Group

MEMA * *

classifications

Name + abb.	Structure	chemical	Polarity of side chain	Biological ^{neutral}	Metabolic	Notes
Glycine gly = G	$\begin{array}{c} \text{COOH} \\ \\ \text{NH}_3^+ - \text{C} - \text{H} \\ \\ \text{H} \end{array}$	Neutral	non-polar	Non-essential	glucogenic	- Optically inactive.
Alanine ala = A	$\begin{array}{c} \text{COOH} \\ \\ \text{NH}_3^+ - \text{C} - \text{H} \\ \\ \text{CH}_3 \end{array}$	Neutral	non-polar	Non-essential	glucogenic	
Valine Val = V	$\begin{array}{c} \text{COOH} \\ \\ \text{NH}_3^+ - \text{C} - \text{H} \\ \\ \text{CH} \\ / \quad \backslash \\ \text{CH}_3 \quad \text{CH}_3 \end{array}$	Neutral	non-polar	essential	glucogenic	
Leucine Leu = L	$\begin{array}{c} \text{COOH} \\ \\ \text{NH}_3^+ - \text{C} - \text{H} \\ \\ \text{CH}_2 \\ \\ \text{CH} \\ / \quad \backslash \\ \text{CH}_3 \quad \text{CH}_3 \end{array}$	Neutral	Non-polar	essential	Ketogenic	
Isoleucine ile = I	$\begin{array}{c} \text{COOH} \\ \\ \text{NH}_3^+ - \text{C} - \text{H} \\ \\ \text{H} - \text{C} - \text{CH}_3 \\ \\ \text{CH}_2 \\ \\ \text{CH}_3 \end{array}$	Neutral	non-polar	essential	mixed	
phenylalanine Phe = F	$\begin{array}{c} \text{COOH} \\ \\ \text{NH}_3^+ - \text{C} - \text{H} \\ \\ \text{CH}_2 \\ \\ \text{C}_6\text{H}_5 \end{array}$	Neutral	non-polar	essential	Mixed	Aromatic benzyl
Tryptophan Trp = W	$\begin{array}{c} \text{COOH} \\ \\ \text{NH}_3^+ - \text{C} - \text{H} \\ \\ \text{CH}_2 \\ \\ \text{C} \\ / \quad \backslash \\ \text{C}_6\text{H}_4 \quad \text{NH} \end{array}$	Neutral	non-polar	essential	mixed	Aromatic indole group benzyl
Methionine met = M	$\begin{array}{c} \text{COOH} \\ \\ \text{NH}_3^+ - \text{C} - \text{H} \\ \\ \text{CH}_2 \\ \\ \text{CH}_2 \\ \\ \text{S} \\ \\ \text{CH}_3 \end{array}$	Neutral	non-polar	essential	glucogenic	Sulfur group

Serine Ser = S	$ \begin{array}{c} \text{COOH} \\ \\ \text{NH}_3^+ - \text{C} - \text{H} \\ \\ \text{H} - \text{C} - \text{OH} \\ \\ \text{H} \end{array} $	Neutral	polar-nonionized	non-essential	glucogenic	it has oxyle group (OH)
Threonine Thr = T	$ \begin{array}{c} \text{COOH} \\ \\ \text{NH}_3^+ - \text{C} - \text{H} \\ \\ \text{H} - \text{C} - \text{OH} \\ \\ \text{CH}_3 \end{array} $	Neutral	polar-non non ionized	essential	glucogenic	oxyle group
Tyrosine Tyr = Y	$ \begin{array}{c} \text{COOH} \\ \\ \text{NH}_3^+ - \text{C} - \text{H} \\ \\ \text{CH}_2 \\ \\ \text{C}_6\text{H}_4 \\ \\ \text{OH} \end{array} $	Neutral	polar non-ionized	non-essential	Mixed	oxyle group aromatic Phenyl
Asparagine Asn = N	$ \begin{array}{c} \text{COOH} \\ \\ \text{NH}_3^+ - \text{C} - \text{H} \\ \\ \text{CH}_2 \\ \\ \text{C} = \text{O} \\ \\ \text{NH}_2 \end{array} $	Neutral	polar non-ionized	non-essential	glucogenic	Amid group or Carbonyl
Glutamine Gln = Q	$ \begin{array}{c} \text{COOH} \\ \\ \text{NH}_3^+ - \text{C} - \text{H} \\ \\ \text{CH}_2 \\ \\ \text{CH}_2 \\ \\ \text{C} = \text{O} \\ \\ \text{NH}_2 \end{array} $	Neutral	polar non ionized	non-essential	glucogenic	Amid group carbonyl
Cysteine Cys = C	$ \begin{array}{c} \text{COOH} \\ \\ \text{NH}_3^+ - \text{C} - \text{H} \\ \\ \text{CH}_2 \\ \\ \text{SH} \end{array} $	Neutral	polar non ionized	non-essential	glucogenic	Sulfur group sulfidryl
Aspartic Asp = D aspartate	$ \begin{array}{c} \text{COOH} \\ \\ \text{NH}_3^+ - \text{C} - \text{H} \\ \\ \text{CH}_2 \\ \\ \text{C} = \text{O} \\ \\ \text{OH} \end{array} $	acidic	polar ionized	non-essential	glucogenic	mono amino dicarboxyle
Glutamic Glu = E glutamate	$ \begin{array}{c} \text{COOH} \\ \\ \text{NH}_3^+ - \text{C} - \text{H} \\ \\ \text{CH}_2 \\ \\ \text{CH}_2 \\ \\ \text{C} = \text{O} \\ \\ \text{OH} \end{array} $	acidic	polar ionized	non-essential	glucogenic	mono amino dicarboxyle

Histidine His = H	$ \begin{array}{c} \text{COOH} \\ \\ \text{NH}_3^+ - \text{C} - \text{H} \\ \\ \text{CH}_2 \\ \\ \text{C} = \text{CH} \\ \quad \\ \text{H} \quad \text{N} \quad \text{C} = \text{N} \quad \text{H} \\ \\ \text{H} \end{array} $	basic	polar ionized	essential semiessential	glucogenic	monocarboxylic diamino imidazole group
Lysine Lys = K	$ \begin{array}{c} \text{COOH} \\ \\ \text{NH}_3^+ - \text{C} - \text{H} \\ \\ \text{CH}_2 \\ \\ \text{CH}_2 \\ \\ \text{CH}_2 \\ \\ \text{CH}_2 \\ \\ \text{NH}_3^+ \end{array} $	basic	polar ionized	essential	glucogenic ketogenic	monocarboxylic diamino epsilon
Arginine Arg = R	$ \begin{array}{c} \text{COOH} \\ \\ \text{NH}_3^+ - \text{C} - \text{H} \\ \\ \text{CH}_2 \\ \\ \text{CH}_2 \\ \\ \text{CH}_2 \\ \\ \text{NH} \\ \\ \text{C} = \text{NH}_2^+ \\ \\ \text{NH}_2 \end{array} $	basic	polar ionized	essential semiessential	glucogenic	monocarboxylic diamino guanidinium group

Classifications of amino acids:-

1- chemical classification:-

according to the number of acidic and basic groups:-

1- neutral : G A V L I F W M P
S C T Y N Q

2- acidic : D E

3- Basic : K R H

2- Polarity :

in physiological pH

1- Non-Polar - Non-ionized : G A V L I F W M P

2- Polar - Non-ionized : S C T Y N Q

3- polar - ionized : D E K R H

3- Biological Classification:- (Nutritionally)

1- Essential: Can't be formed in the body, it is essential to be taken in a diet. Their deficiency affects growth.

10 Non-essential: are formed in the body in amount enough for adults and children. **G A P S C Q N D E Y**

2 Some times Semiessential: are formed in the body but not in sufficient amount for body requirements especially in children.

H - R

3- Metabolic Classification:-

according to metabolic or degradation products of a.a:

2 Keto genic a.a: gives ketone bodies **L, K** (pure ketog-)

4 Mixed Ketogenic and glucogenic a.a: gives both ketone bodies and glucose. **I F Y W**

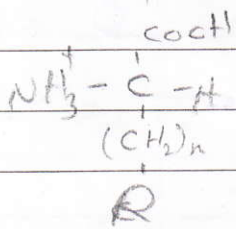
4 glucogenic a.a: gives glucose.

by catabolism yields products that enter in glycogen and glucose formation.

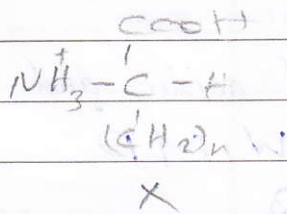
G A V T M R S C Q N D E R H

Polarity \Rightarrow

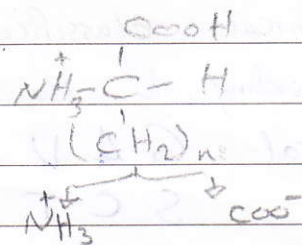
① **N, N**



② **P, N**



③ **P, I**



X = ~~Non~~ polar neutral groups:-

- Hydroxyl (OH) = **S T Y**

- Sulfidryl (SH) = **C**

- Amide (CONH_2) = **Q N**

- Indol group = (Try) **W**

4- Rare type of A.A (post-Translational modification)

- Hydroxy proline (found in collagen)

- Hydroxy lysine (found in collagen)

- N-methyl lysine (found in myosin)

Non protein A.As:-

Citrullin and Ornithin

- β -Alanine

- DOPA

- taurine

- Glutamate